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ABSTRACT

Energy education units (consisting of a general teacher's guide and nine units containing a wide variety of energy lessons, resources, learning aids, and bibliography) were developed for the Indiana Energy Education Program from existing energy education materials. The units were designed to serve as an entire curriculum, resource document, supplementary materials, or as a laboratory manual of "hands-on" activities which could be infused into existing grades 9-12 curricula. Unit I, focusing on energy decision-making related to housing and home furnishings, consists of an introduction (rationale, unit objective, and general background information), five lessons, unit resources, bibliography and teacher evaluation form. Each lesson includes title, objectives, background information, activities, evaluation techniques, and resources. Titles of lessons are: (1) Water Heaters and Water Usage; (2) Home Lighting Plan - Which Conserves Energy? (3) Appliance Energy Use; (4) Caulking and Weatherstripping; and (5) Windows and Energy. (Author/JN)

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LESSONS from An Energy Curriculum for Senior High Grades

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LESSONS FROM AN ENERGY CURRICULUM

FOR THE SENIOR HIGH GRADES

Unit I -- Energy Decision Making
(Housing and Home Furnishings)

Division of Energy Policy
Indiana Department of Commerce
Lt. Governor John M. Mutz, Director

Division of Curriculum
Indiana Department of Public Instruction
Harold H. Negley, Superintendent

April 1982

FOREWORD

Indiana educators have always responded to the demands placed upon them by society to resolve natural and human resource issues and problems. The task of teaching energy concepts and conservation practices to Indiana's youth is a response to energy problems facing our state and nation. It will be accomplished by many high school teachers and students getting involved in energy education.

We feel that students of all ages must be taught an energy conservation ethic. This ethic will enable each student to use Indiana's and America's energy resources more efficiently and with less waste. To help high school teachers accomplish this major goal, we are pleased to introduce a new Senior High School Energy Education Curriculum. This exciting and innovative program contains energy education activities, programs and resources for you and your students.

We encourage you and your students to get involved in the lessons presented here. We hope you will use these materials as a starting point and go far beyond by involving other classroom teachers, students, resource agencies and citizens in your community. A broad educational effort is needed to help prepare students to deal with this growing issue which affects us all.

Harold H. Negley
State Superintendent of
Public Instruction

John M. Mutz
Lieutenant Governor
State of Indiana

ACKNOWLEDGMENTS

The Energy Education Curriculum Project is coordinated by the Indiana Department of Public Instruction, Division of Curriculum, with the support and assistance of the Indiana Department of Commerce, Division of Energy Policy.

These materials, from the senior high grades segment of the Energy Education Curriculum Project (EECP), were adopted from existing national energy education programs. The materials were selected by the EECP staff with assistance and direction from a Review Panel and the Energy Education Steering Committee.

George Cannon, Patricia Shutt and Joe Wright, Energy Education Consultants, coordinated and supervised the preparation, evaluation and dissemination of the senior high energy education materials. Carol Wood, Teacher Associate, assisted the EECP staff with the design and dissemination phase of the materials.

Members of the Senior High Energy Education Steering Committee are -- John A. Harrold, Director of the Division of Curriculum; Darrell Morken, Director of the Division of Traffic Safety; Gary Geswein, Vocational Agriculture Consultant; Jerry Colglazier, Science Consultant, Joyce Konzelman, Home Economics Consultant; Jane Lowrie, Social Studies Consultant, Victor Smith, Research and Evaluation Coordinator; Gregg Steele, Industrial Arts Consultant.

Clarence Broadus, Director, and Michael Hennegan, Residential/Education Coordinator, Division of Energy, offered suggestions and comments which helped to improve the materials.

The materials included in this unit of the senior segment of the Energy Education Curriculum Project (EECP) were adopted with permission from:

> Energy Management Strategies for Colorado Home Economics Teachers, developed by the Colorado State Board of Community Colleges and Occupational Education, by the Public Service Company of Colorado and by Energy and Man's Environment of Portland, Oregon.

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UNIT I

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INTRODUCTION
(Rationale)

ENERGY EDUCATION- WHAT IT IS - Past, Present, Future

Energy education is the attempt to resolve the conflict between our present life style and the energy costs in both dollars and resources to produce and maintain that life style.

Energy education is reality education in that it deals with that which exists here and now.

But, energy education is also a study of futuristics. The future that all of us must be willing to live in and accept is the one that we are creating right now by our daily decisions. We must examine the beliefs that "growth is good" and "bigger is better" and determine the impact these beliefs will have on our future.

Energy educators interested in the challenge to teach students about local, state, national and global energy resources, problems and issues should consider the following questions:

1. Can you help prepare your students to make wise and careful decisions about our reminaing non-renewable energy resources?

2. Can you help prepare them to investigate and make wise decisions about research and development efforts for alternate and renewable resources, recycling programs, more efficient transportation systems, better personal consumption habits, and a personal commitment to energy usage?

3. Can you explain to your classes where energy comes from, the basic sources of energy how long our non-renewable energy resources will last, and the energy options among which our nation's people must choose if we are to survive?

The three questions above suggest that energy education is a challenge which encompasses all facets of living. Energy education is an opportunity for students to have impact on a long-lived problem, an opportunity to apply traditional content and skills to an important problem situation, and an opportunity for students to participate in personal and social decisions.

WHY STUDY ENERGY?

"One of the best ways to deal with a crisis is to consider it as an opportunity. From this point of view, the Energy Crisis provides almost endless possibilities for children to learn

about themselves." Energy, after all, is what makes all things go. We need to realize that the energy crisis isn't just the newest fad. By studying the energy crisis, students can see where humanity has been, where it is now, and where it might be going. The energy crisis is another chapter in the story of mankind's continuing effort to reshape the world and the inevitable cost of doing that."[1]

To insure proper utilization of energy sources, our society must be educated about alternative life styles, energy resources, technology, consumer behavior and occupations.

The Indiana State Department of Public Instruction, in corporation with the Division of Energy Policy, has organized the Energy Education Curriculum Project (EECP) to meet the challenge of educating young people (our future adults) about energy, the energy crisis and the role they can play to help conserve America's economy and resources.

One of the ways that the Energy Education Curriculum Project staff has dealt with the task of disseminating energy information and education is through the Indiana Energy Curriculum Units. The units have been organized to help provide educators in many areas with lessons, charts, materials and "hands-on" activities to be used in the classroom.

[1]Kuhn, David J., "Teaching the Energy Lesson," in The Science Teacher, September 1978.

The Curriculum Background Information:

The Energy Education Units contained in the Senior High program were adopted from existing national energy education materials. Because of large amounts of energy education material already in print, the EECP staff decided to utilize these activities and resources and adapt them to Indiana's energy program. Therefore, a team of teachers from Indiana reviewed and evaluated energy documents from across the nation. After thoroughly reviewing the materials, only those activities or lessons which proved to be most effective in educating students were chosen for Indiana's program.

The units are designed to be used as the individual teacher wishes. The energy units could be used as the entire curriculum or as a resource document, supplement or laboratory manual of "hands-on" activities which can be infused into already existing curricula.

The Indiana Energy Education material for grades 9-12 consists of a Teacher Guide, nine units containing a wide variety of energy lessons, resources, learning aids and a bibliography.

Unit I

Unit I, entitled "Energy Decision Making" (Housing and Home Furnishings), begins the nine-unit series by relating energy education directly to the student and his/her own home. This helps the student to relate easily to energy education and see its validity.

Unit Objective

The student will practice wise decision making when using energy. The student will be able to describe the type of energy used and explain how much energy is used in his/her home.

Background Information

Because of the many technological advancements made today, there are a variety of alternatives confronting people when they think about energy use, how much energy they should use and storage of energy.

This unit presents a variety of energy alternatives. The unit teaches that it is everyone's responsibility to make wise energy choices in his/her everyday life.

UNIT I

LESSONS

A-E

Note: The lessons that follow can be infused into an already existing curriculum. It is hoped that the teacher will incorporate those lessons which relate to the course of study in the most beneficial manner.

LESSON TITLE: "Water Heaters and Water Usage"

LESSON OBJECTIVES:

The student will:

1. Select water heaters based on size, location and temperature, for their own home.

2. Compare the amount of water used and energy saved between showering and bathing.

3. Relate to other family members ways to save water and energy in the home.

4. Explain his/her family's hot water consumption and recommended conservation measures.

BACKGROUND INFORMATION - See Attached

ACTIVITIES - See Assignments Attached

Evaluation Techniques

Upon completion of assignments, student will be able to conserve water as evidenced by their increased awareness of alternative methods in water usage.

RESOURCES

Contact your local public utility company and local land grant (state) university.

Energy and Man's Environment, 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201.

Energy Conservation in the Home - an energy education conservation curriculum guide for Home Economics teachers. U.S. Department of Energy, prepared by the University of Tennessee Environment Center & College of Home Economics, Knoxville, Tennessee, 1977.

BACKGROUND INFORMATION

I. Water Heaters and Water Usage

A. Water Heaters

1. When purchasing a water heater, match its size to the needs of your family. Oversized water heaters use more energy than necessary.

2. Heating of water continues even if hot water is not being used. Get a well-insulated hot water heater that uses as little heat as possible, minimizing the re-heating process. Set the thermostat no higher than necessary for household uses. This is also appropriate if an automatic dishwasher is used. Set lower when on vacation.

3. Place the water heater as close as possible to where hot water is used. Long runs of pipe cool hot water, thus increasing operating costs. If you do have long pipe runs, insulate the pipe to decrease heat loss. This also conserves water which may be wasted by letting it run until it gets hot.

4. If you have a separate water heater for a bathroom, set it only at 110°-120° to save energy. Thus the water will be warm enough for comfort the additional heat for sanitation is not necessary here, as for a dishwasher, etc.

B. Other Water Saving Practices

1. Showers

a. Especially those fitted with flow restrictors or low volume heads, usually use less than a bath. But limit your stay! If you prefer a bath, refrain from completely filling the tub. A 5 minute shower uses 25 gallons. A bath uses 30 gallons. (What if you take long showers?)

b. Do your showering and hair washing in one step. It takes less water than doing the hair separately.

c. Turn water off in shower while lathering, shaving legs, etc. and turn on to rinse.

2. When washing dishes by hand, use a dishpan or stopper in the sink so you won't need to run the hot water continuously.

3. When brushing teeth or shaving, run the water only when needed rather than continuously. (This also works with showers. Get wet, turn off, lather up and rinse!)

4. One leaky faucet can waste up to 2,200 gallons of water a year - enough to quench your thirst with 35,200 glasses of water (8-ounce size). It may only require changing the washer of the faucet. (You will not only be saving the energy needed to heat the water but the energy needed to pump the water to your house.)

5. Toilets

a. A water-filled, capped bottle (quart size) in a toilet's water tank, or an adjustment of the float level reduces the normal 4.1 gallons of water to flush a toilet.

b. A toilet leak can waste lots of water. Put a few drops of food coloring in your tank. If colored water shows in the bowl without flushing, there's a leak and repairs are needed.

c. Avoid using the toilet as a trash basket. Tissues should go in the waste basket and cigarette butts in the ashtray.

C. Energy Usage

100 watts = 1 kilowatt

1 kilowatt x 1 hour of use = 1 kilowatt hour
KW x 1 hour = KWH
1 KWH x average KWH cost = cost of operation

1 KWH will heat 4 gallons of water 100°F. temperature rise
.25 KWH will heat 1 gallon of water 100°F. temperature rise.

1000 cubic feet of gas will heat 1 gallon of water
1 MCF x average MCF cost = cost of operation

1.3 cubic feet of gas will heat 1 gallon of water
100°F. temperature rise
(calculated at 840 BTU/cubic foot)

If the BTU content is different in your area, divide 1111 by the BTU content to derive quantity of gas needed to heat 1 gallon of water.

*Note: In some areas, natural gas may be sold in therms rather than cubic feet. One therm equals 100,000 BTU's. (British Thermal Units) and 1 BTU will raise the temperature of one pound of water one degree Fahrenheit. One gallon of water weighs 8.33 pounds.

ACTIVITIES

(Assignment)

Teacher Material

Level I

1. Shower vs. bath activity attached - student material.

2. Have the students do a collage of pictures of all the ways and areas in which they could conserve water. Have them share this with one another and then use the collages in a bulletin board or as part of a wall display.

3. (This activity could be used both in Level I and II) Have the students watch the newspaper for articles relating to water usage. Clip them out and bring to class. Discuss the implications of these articles on our lives.

Level II

1. Hot Water Audit Activity attached - student materials.

2. Have students draw a floor plan for optimum water and energy conservation by placing the hot water heater near sources of use. Be sure they all share their drawings with one another.

ACTIVITIES

(Assignment)
Student Material

Shower vs. Bath

Objective: To demonstrate that a short shower is more energy conserving than a bath, and that lengthy showers waste hot water and energy.

If people took short showers instead of baths or lengthy showers, a lot of energy could be saved. It takes about an ounce of oil (or a cubic foot of gas, or ¼ kilowatt-hour of electricity) to heat a gallon of water.

Compare the water used for a bath and a shower. Fill your bathtub (at the temperature and depth you like best) and measure the depth with a yardstick (when you are out of the water). Record the depth: _____ inches. At your next bathing time, take a shower (in the same tub). Keep the drain closed during your shower, but be careful not to overflow the tub. (Do not rush your shower; take your time!) This time record your bathing time as well as the water depth.

Beginning Time _____ Ending Time _____

Duration of Shower _____ Water Depth _____

If you took a short shower, it should have required only about half as much water as your bath.

Questions:

1. What bathing practice is more conservative for you?
2. What would be the energy impact of taking a 20-minute shower?
3. What are some other ways to conserve energy while bathing?

Suggestions:

1. If your shower was lengthy you may need to measure the depth, empty the tub and then finish your shower and measure again. Add the two depths.
2. Investigate the bathing practices of other members of your family. Who is most conservative?

(Assignment)
Student Material

Hot Water Audit

Objective: To demonstrate a family's hot water consumption and possible conservation measures.

The major uses of hot water in the home are for bathing and laundry. Use the data sheet provided to estimate your family's hot water consumption for a week.

Task	Number of times per week	Multiplier (in gallons)	Quantity of Hot Water (in gallons)
Laundry loads		15	
Tub baths		25	
Showers		20	
Dishwasher loads		10	
Washing dishes by hand		5	
		Total	

Tally the number of times per week the task using hot water occurs. Then multiply the number of times by the multiplier provided. The multiplier is the average amount of hot water required for the task. The resulting value is the quantity of hot water consumed for the task. Then add the quantities for each task to arrive at an estimate of the hot water your family uses in one week. (The average household uses about 350 gallons of hot water per week.)

You can now approximate the energy required to supply this quantity of hot water.

ELECTRIC WATER HEATER

_____ gallons x .25 KWH/gal. = _____KWH

If you use _____ gallons per week, you use approximately 52 times that per year, or _____ gallons.

Calculate the energy cost for a year's consumption:

_____ gallons x .25 KWH/gal. = _____KWH

This is _____ KWH for one year.

Find out the rate in your area for electricity per KWH and determine the cost of one year's hot water consumption.

_____ KWH x _____ cents/KWH = $_____

yearly energy consumption for hot water — rate

GAS WATER HEATER

_____ gallons x 1.3 cu. ft./gal. = _____ cu. feet

If you use _____ gallons per week, you use approximately 52 times that per year, or _____ gallons.

Calculate the energy cost for a year's consumption:

_____ gallons x 1.3 cu. ft./gal. = cu. feet

This is _____ MCF (cu. ft. divided by 1000) for one year.

Find out the rate in your area for natural gas per MCF and determine the cost of one year's hot water consumption.

_____ MCF x _____ = $ _____

yearly energy consumption for hot water — rate/MCF

How could you save money and energy on hot water at your house?

Some things to look for if your hot water consumption is high:

1. Check your water heater's thermostat - it should be set at 140°F. or less.
2. Check for leaks.
3. Are the hot water pipes insulated?
4. Install flow restrictors and/or water saving shower heads.

Suggestions:

1. Students should bring in their tallies of frequencies from home and do the calculations as a class.
2. All of the figures and calculations in this activity are based on averages and estimates and do not indicate actual hot water use.

3. Students should list ways their families might conserve hot water usage.
4. Students could undertake a family project to cut water usage by 10-15-20 per cent during a given time period, i.e., one month, six months.

Reference for Activities:

Adapted from An Energy Education/Conservation Curriculum Guide, field testing draft, University of Tennessee, 1977.

Activity for Evaluation

Assignment

1. A normal temperature setting for a water heater is:

   a. $110^{o}F.$
   b. $140^{o}F.$
   c. $100^{o}F.$
   d. $130^{o}F.$

2. A separate water heater for a bathroom should be set at _____ to save energy.

   a. 110^{o}-$120^{o}F.$
   b. 140^{o}-$150^{o}F.$
   c. 100^{o}-$110^{o}F.$
   d. 130^{o}-$140^{o}F.$

3. Give an example of how to conserve water in the shower.

4. Give an example of how to conserve water in the toilet.

Assignment
Teacher Material

Answer Key to Assignment Sheet

1. (b) 140°F.

2. (a) 110°-120°F.

3. See B. 1. a, b and c on outline Background Information

4. See B. 1. a, b and c on outline Background Information

LESSON TITLE: "Home Lighting Plan Which Conserves Energy"

LESSON OBJECTIVE

Upon completion of this lesson the student should be able to devise a home lighting plan that is both useful and conserves energy by being able to:

1. Distinguish between the different types of lighting and the purpose of each.
2. Suggest methods to cut back energy consumption through home lighting.
3. Demonstrate the relative energy efficiency of fluorescent and incandescent lighting.

BACKGROUND INFORMATION - See Attached

ACTIVITIES - See Assignments Attached

Evaluation Techniques

After completion of assignments students will be able to efficiently conserve energy in home lighting.

RESOURCES

"The Light Book - How to be at Home with Lighting," General Electric, Cleveland, Ohio.

Contact your local utility company and/or local land grant (state) university.

BACKGROUND INFORMATION

I. Lighting

While lighting is only a small percentage of your total utility bill, there are many ways it can be improved.

A. Three general types of lighting needs - use proper lighting for assignment. It saves energy in the end!

1. General - 5-10 Foot Candles*

*A foot candle is the amount of light on a surface one foot from a candle.

a. Television viewing
b. Hallways
c. Stairs
d. Closets
e. This type of lighting is needed mostly for eye comfort.
f. Needed in order to move easily through a room.

2. Task Lighting - recommended foot candles

a. 10-20--card playing
b. 20-30--casual reading, easy sewing, facial makeup
c. 30-50--household activities in kitchens, laundry
d. 40-70--prolonged reading or study, machine stitching, musical activities, shaving.
e. 100-200--fine sewing, hobbies with small details
f. Make sure you have a light fixture or portable lamp that gives you enough light for the work being done but does not glare or hurt your eyes.

3. Special Purpose

a. Security or safety lighting - The lighting required for either security or special hazard areas where you need lighting at specific levels to ensure your own safety.

b. Accent or decorative lighting - Creates focal points, emphasizes pictures, art objects and other cherished possessions; adds the personal and distinctive touch.

B. Practical Energy Saving Tips with Lighting

1. Turn all lights off when not in use.

2. Use fluorescent lights whenever possible. They produce about four times as much light per watt as incandescent lights. (Note: Basements are ideal places to convert to fluorescent light.)

3. Choose the right size and type of light bulb for the lighting job. One 150 watt bulb is more efficient than two 75 watt bulbs.

4. Use the right wattage bulb for the fixture. If the fixture calls for a 60 watt and you install a 100 watt, the additional heat produced may cause damage to the fixture and shorten the life of the bulb.

5. Install dimmer switches in those areas where they will benefit your needs.

6. Install permanent timers on outside lights. Use inside timers for lights when the family is away.

7. Reduce or eliminate ornamental lighting.

8. When decorating, use light colors on walls, floors and ceilings. They reflect more light into the room. Dark colors absorb light and will require higher levels of light input.

9. Clean all lighting fixtures to maintain their efficiency.

ACTIVITIES

(Assignment)
Teacher Material

Level I

1. Take the students on an in-school walking field trip and point out fluorescent and incandescent bulbs. Then have them go home and identify the types of lighting they have in their own homes.

2. Have them keep a tally of how many times they see lighting waste energy at home. Then have them share conservation hints with their families and again keep a tally. (Amount of time is up to you.) Afterwards, discuss if there was improvement. If not, possible reasons why.

3. Have the students design and make a bulletin board (either for your room or for a grade school) on how to conserve energy through lighting.

Level II

1. Have students explain fluorescent and incandescent lighting.

2. Since lighting is something even small children can help conserve, have the students create a puppet show that will help younger children understand ways they can conserve by turning off lights, etc. Have them construct puppets and give the puppet show at a local grade school, etc.

3. Give the students a floor plan with specific purposes and tasks for each room. Have them determine the type and amount of lighting needed.

(Assignment)
Student Material

Fluorescent vs. Incandescent Lighting

Objective: To demonstrate the relative energy efficiency of fluorescent and incandescent lighting.

Wattage is not a measure of the amount of light given off by a light bulb, but how much energy is required to operate it. The amount of light it provides is indicated in lumens. Bulb packages should give not only the wattage required, but also the lumens produced by the bulb. Using bulb packages, compare several incandescent and fluorescent bulbs for efficiency (lumens per watt).

For example: A 100-watt incandescent bulb may yield 1750 lumens which gives the bulb an efficiency of _____ lumens per watt:

$$\frac{1750 \text{ lumens}}{100 \text{ watts}} = 17.5 \text{ lumens per watt}$$

Determine the efficiency of the following bulbs, plus any others you may have:

A. 100 watt fluorescent bulb:

$$\frac{\text{_____ lumens}}{100 \text{ watts}} = \text{_____ lumens per watt}$$

B. 40 watt fluorescent bulb:

$$\frac{\text{_____ lumens}}{40 \text{ watts}} = \text{_____ lumens per watt}$$

C. 100 watt incandescent bulb:

$$\frac{\text{_____ lumens}}{100 \text{ watts}} = \text{_____ lumens per watt}$$

D. 25 watt incandescent bulb:

$$\frac{\text{_____ lumens}}{25 \text{ watts}} = \text{_____ lumens per watt}$$

1. Which type of lighting is more efficient - incandescent or fluorescent? _____

2. Is it more efficient to buy four 25-watt or one 100-watt incandescent bulb? _____

From An Energy Education/Conservation Curriculum Guide, field testing draft, University of Tennessee, 1977.

Activities - Continued

(Assignment)
Student Material

Fill in the blank:

1. The three types of lighting are _____, _____, and _____.

2. Choose the right _____ and _____ of light bulb for the lighting job.

3. Reduce or eliminate _____ lighting.

4. Use _____ lights whenever possible. They produce about four times as much light per watt as _____ lights.

5. A _____ candle is the amount of light one _____ from a candle.

6. Tell in your own words two ways to reduce energy consumption of lighting in your own home.

Activities - Continued

(Assignment)
Teacher Material

Suggestions:

1. Ask the school maintenance supervisor for empty fluorescent light bulb boxes. The information you need is on the box, not the bulb.

2. Have student bring in bulb boxes from home.

3. Check at home for the use of multiple low wattage bulbs where a larger wattage bulb might be used to save energy. But remember, a larger wattage bulb gets hotter during operation and some fixtures are not designed for the larger wattage bulbs.

4. Discuss the comparative lifetimes of fluorescent and incandescent bulbs.

5. Discuss the turning off and on of incandescent and fluorescent bulbs.

Answer Key to Assignment Sheet

1. General, Task, Special Purpose

2. Size, type

3. Ornamental

4. Fluorescent, Incandescent

5. Foot, Foot

6. Suggestions should include:

   a. Lighting for the specific purpose (general, task or special) Don't over-light.
   b. Turn off lights when not in use.
   c. Use fluorescent as opposed to incandescent.
   d. Choose the correct wattage bulb for maximum effectiveness.
   e. Possible installation of dimmer switches and timers.
   f. Reduce or eliminate ornamental lighting.
   g. Keep fixtures clean to maintain efficiency.
   h. Use light colors on the walls; they reflect more light.

LESSON TITLE: "Appliance Energy Use"

LESSON OBJECTIVE

The student will be able to discuss ways to conserve energy when using appliances and calculate how much energy appliances use by being able to:

1. List ways to conserve energy for televisions and radios.

2. Demonstrate the extent of use of entertainment devices and their impact on energy use.

3. Give general examples of energy conservation measures for appliances.

4. Estimate the amount of energy consumed by a given appliance over a given length of time and translate that into dollars spent.

BACKGROUND INFORMATION - See Attached

ACTIVITIES - See Assignments Attached

RESOURCES

Contact your local utility company.

Use books or manuals that come with appliances.

BACKGROUND INFORMATION

I. Appliance Energy Usage

A. Television and Radios

1. When no one is listening to the radio, or watching the television, turn them off.

2. "Instant-on" television sets draw electricity 24 hours a day. Some sets have switches to turn off the instant-on feature during hours when not in use. If you do not have this feature, unplug the television set.

3. If buying a new television set, look for the solid state type. It uses less power than older tube types. Color sets use more electricity than black and white.

4. Use fewer lights when watching television.

B. General Tips

1. Become thoroughly familiar with the operation of all your appliances. Read the "use and care" book to make sure you are not wasting energy by using the appliance incorrectly.

2. Don't overload electrical circuits. Overloading results in reduced energy efficiency. If you're unsure of circuit capacity or attached load, call your electrician.

3. Don't put off needed repairs. Worn parts may increase energy use needlessly as well as putting excessive wear on the appliance.

4. Use a small appliance (or elbow grease) in place of major appliance whenever possible. It uses less energy.

C. Cost of Running Various Appliances - "Which Costs the Most?" See attached assignment sheets. Level II only. (Note: Pick especially the appliances related to interior, i.e. #3,5,6,7,8,9 and 14; as opposed to kitchen appliances.)

Assignment
Teacher's Guide

Level I

1. Have students do a tally in their homes of how many times they find a television on and no one watching it or both a television and radio on, etc. Then have them try to cut down on the numbers recorded on the tally.

2. Demonstrate the use of small appliances such as crock pots, broiler ovens, electric fry pans and elbow grease such as mixing a cake by hand, etc., as opposed to using larger appliances. Give students actual "hands on" experience with these appliances in a laboratory setting.

Level II

1. Entertainment Practices Activity. See attached assignment sheets.

2. Have students write a manual for a new electric appliance that mixes, slices, chops, fries, shreds and toasts. These specifics aren't as important as the general hints that should be included to apply to almost every electrical appliance and energy conservation. Have them share their ideas with one another.

Answer Key to Assignment Sheet

1. Solid state

2. Lights

3. Repairs, increase

4. c

Assignment
Teacher Materials

Which Costs the Most?

Due to the different power requirements (watts) of household appliances, some cost more to operate per hour than others. Time: 30 minutes. Materials: Worksheet #1 and Worksheet #2, overhead projector, chalkboard.

Procedure:

1. Make a spirit master of Worksheet #2.
2. Make a transparency of Worksheet #1.
3. Explain the concept of a "mill" (.001 of a dollar).
4. Ask students to choose 10 appliances they "need" in their homes.
5. Instruct them to plot a histogram of the cost per hour vs. the ten appliances, using Worksheet #2.
6. Make a "class data" composite histogram on the chalkboard listing the ten most expensive appliances per hour of operation.
7. How could money and energy be saved in the future use of each appliance?

Reference: Adapted from Energy Activities for the Classroom, ERIC Center for Science, Mathematics, and Environmental Education, College of Education, Ohio State University, 1976. pp. 23-24.

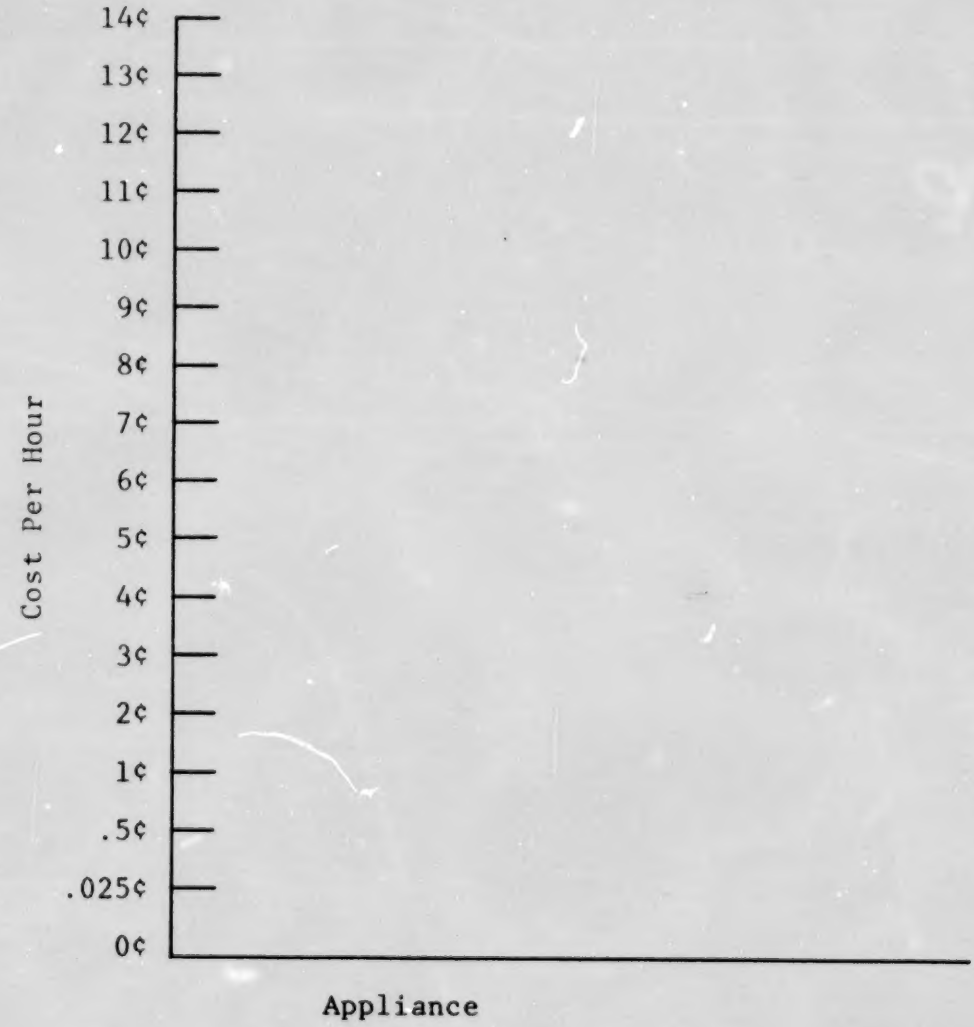
Student Material

WORKSHEET #1

Cost of Electricity for One Hour of Use

1.	Tooth Brush	$ .0002 (2 hundredths of a cent)
2.	Toaster	.04
3.	Electric Water Heater:	
	Tub Bath	.09 - .14
	Shower	.07 - .15
	Automatic Washer	.17
	Dishes by Hand	.02
	Dishwasher	.09 - .14
4.	Freezer	.005 (½ cent)
5.	Lights:	
	Incandescent - 100 watt	.0038
	Fluorescent - 40 watt tube	.0019
6.	Record Player	.004
7.	Air Conditioning	.038
8.	Radio	.002
9.	Television:	
	Black and White:	
	Solid State	.002
	Tube	.006
	Color:	
	Solid State	.007
	Tube	.01
10.	Range:	
	Large Surface Unit	.038
	Small Surface Unit	.02
	Bake	.02
	Broil	.13
11.	Dishwasher	.045
	Hot Water	.14
12.	Refrigerator/Freezer - 14 cu/ft:	
	Frostless	.008
	Manual	.005
13.	Microwave Oven	.05
14.	Clock	.007

WORKSHEET #2



Assignment
Student Material

Entertainment Practices

Objective: To demonstrate the extent of use of entertainment devices.

Teenagers and young adults are often abusers of entertainment devices. In one household as many as four or five devices may be operating at the same time. Take a survey of the students at your school to determine the extent of their use of entertainment devices. Use the following form.

Device	Hours of Use Per Day	or Hours of Use Per Week
Black and white TV		
Color TV		
Radio		
Tape player		
Stereo		
Electric Instrument		
Model trains or cars (electric)		
Electric games		
Slide projector		
Movie projector		

From your survey calculate the average hours of operation for a year for one student. To do this, take the total hours a week of all those surveyed and divide by the number of students surveyed. This yields the average hours of operation for one week. Then multiply by 52 (52 weeks in a year).

$$\frac{\text{Total hours per week}}{\text{Number of students surveyed}} = \text{_____ average/week}$$

_____ average/week x 52 = _____ average/year

Now use the total number of students in your school to estimate the total hours of operation of entertainment devices for one year.

_____ average/year x _____ number of students in your school =

_____ operation per year of entertainment devices by your school's students.

It might also be enlightening to determine the quantity of records and tapes the students at your school purchase in a year. Remember, tapes and records are petroleum products.

Suggestions:

1. Randomly survey at least 25 students.
2. The hours of use per day should be recorded for very frequent use and then converted to hours per week.
3. Publicize your results and offer suggestions for reducing this energy use.
4. Survey entire families.
5. This activity makes a good class project. Do calculations on the board.

From An Energy Education/Conservation Guide, field testing draft, University of Tennessee, 1977.

Assignment
Student Material

1. When buying a television set, look for one that is _____ _____. It uses less energy.

2. Use fewer _____ when watching television.

3. Don't put off needed _____. Worn parts may _____ energy use.

4. With regard to all the appliances we use, which of the following hints would not help save energy:

   a. Read the "use and care" booklet to become thoroughly familiar with the operation of your appliance.

   b. Be sure to clean filters, etc., and make any necessary repairs.

   c. Plug as many appliances into a circuit as possible to achieve maximum use from that outlet.

   d. Use a smaller appliance whenever possible.

LESSON TITLE: "Caulking and Weatherstripping"

LESSON OBJECTIVES

After completion of this lesson the student will:

1. Demonstrate how to caulk and weatherstrip.
2. List the types of caulking compounds.
3. Apply caulking to cracks in a home.
4. List the types of weatherstrippings.
5. Apply weatherstripping to a door or window.

BACKGROUND INFORMATION - See Attached

ACTIVITIES - See Assignments Attached

RESOURCES

Energy Management Strategies for Colorado Home Economics Teachers, developed by the Colorado State Board of Community Colleges and Occupational Education, by the Public Service Company of Colorado and by Energy and Man's Environment of Portland, Oregon.

Public Service Company of Colorado
an investor-owned utility

EME

COLORADO STATE BOARD
NIL SINE NUMINE
COMMUNITY COLLEGES and OCCUPATIONAL EDUCATION

BACKGROUND INFORMATION

I. Caulking

A tiny crack around the window frame might seem insignificant. But add up all the inside and outside cracks of windows, doors and other joints and you've opened the gates for energy waste.

What's responsible for this? Air infiltration. Air infiltration is air leakage that occurs both ways - whether it's air that comes in to reduce the home's comfort level, or "conditioned" air (hot or cold) that escapes to the outside.

Either way it ups energy consumption. So fill those cracks with caulking and weatherstripping - two sure methods that will improve your house's thermal envelope and your energy bills.

Caulking cracks around door and window frames, places where wood and brick siding meet, and joints between the chimney and siding will save energy and money. It should also be used where the house framing meets the concrete foundation and where water pipes, dryer vents and wires pass through walls. The best rule of thumb in applying caulking is any place where two different materials meet.

II. Caulking Compounds

There are several different types of caulking compounds that will do the job. Some last longer than others. Some are less expensive. And some are easier to apply. Still others come in attractive, decorator colors. Whatever your needs, keep these facts in mind when choosing a caulking compound.

Caulking Compounds	Durability	Comments
Acrylic Latex	5-10 years	Easy to apply. Water clean-up, paintable, good elasticity.
Butyl	5-10 years	Solvent clean-up required, skillful application needed, not paintable.

Silicone	20 years	Familiar as bathtub caulking. Most durable, not paintable, instructions should be followed carefully, skillful application needed. Colors are available.

Most of these caulking compounds are available at lumber yards, hardware stores and conservation centers. Other types of caulking are available such as oil base, polyurethane, foam-filled can, rope caulk and backer rod.

III. Weatherstripping

Caulking's good companion is weatherstripping. It reduces air leakage around windows and doors where they meet the frame.

To check for leakage, run your hand along cracks where moving parts of a window or door come together. Any day good for kite flying is a good day for this test.

Don't forget to check doors between conditioned and unconditioned parts of the house such as doors to the garage, basement, workshop, crawl space openings and attic access doors.

Most weatherstripping materials are available at local hardware stores, lumber yards or conservation centers. And again, as with caulking, evaluate the different types and select one that fits your particular needs when making your choice of weatherstripping materials.

IV.

Weatherstrippings	Durability	Comments
Rolled Vinyl with rigid metal backing	5 years	Must make complete contact for proper seal
Foam Rubber	1-2 years	Easy to apply. Short life span.
Thin Spring Metal	5 years and up	May lose some flexibility with time and therefore lose its sealing ability.

Weatherstripping should be checked every year for its condition. If installed correctly the first time, it will be effective for years.

Look for other types of weatherstripping such as vinyl bulb, interlocking threshold, door sweeps, etc.

Information from Public Service Company of Colorado.

Activities
(Assignments)

1. Give student unit objectives.

2. Give student background information.

3. Have a guest speaker for your local utility company give a talk on the benefits and methods of caulking and weather-stripping.

4. Have students do a home energy audit to determine where there are cracks and air leakage in their homes. Report findings to the class.

5. Have students apply caulking (assignment #1).

6. Have students apply weatherstripping (assignment #2).

7. Optional: Have students visit a new home site in which the sub-contractor is doing caulking and weatherstripping on the day of your visit. Additional assignment - visit sub-contractor who is doing caulking and/or weather-stripping on an older home.

Activities
(Assignment)

#1

Caulking Home or School Room

Work with your parents, a neighbor or your landlord to see if they could help you to caulk all the cracks and spaces in the home (or apartment). Using small groups of two or three, work within your school or classroom and apply caulking to a window. Report back to the class or write a summary of your experiences. Following is an outline of the procedure you can use.

Caulking Surface Preparation and Application

Tools: 1" Scraper or Screwdriver
Wire brush
Caulking gun
Clean-up materials
Cloth
Ladder

Materials: Caulking compound, (1/2 cartridge per window), filler material (used to fill large cracks before caulking) such as backer rod, scraps of insulation or sponge rubber.

Follow these steps:

1. Clean all surfaces before caulking. Remove loose paint, dirt and grease. This insures good adhesion. Make sure surface is dry. (If you're replacing or repairing old caulking, remove as much old material as possible.)

2. Fill any deep or wide cracks with filler material.

3. Read the instructions on caulking cartridge V-E-R-Y carefully.

4. Cut the tube end at a 45° angle, puncture seal in nozzle of tube and apply evenly. With some caulking compounds, such as acrylic latex, wetting a finger and running down the caulking bead will leave a smooth surface.

5. When finished, disengage plunger on caulking gun and pull back to stop compound from flowing.

#2

Apply Weatherstripping To A Home

Work with your parent, a neighbor or a landlord to see if they would help you apply weatherstripping to a door or window. Using small groups, apply weatherstripping to a door in your classroom or school. Report back to the class or write a summary of your experiences.

LESSON TITLE: "Windows and Energy"

LESSON OBJECTIVES

The student will be able to determine the amount of heat loss through the windows of his home. The student will be able to identify types of windows which are more efficient to use.

MINI-OBJECTIVES

After completion of this lesson the student should be able to:

1. Relate home heat loss to the amount of window space in the home.
2. Identify types of windows.
3. Determine how heat loss might be minimized in window areas.

BACKGROUND INFORMATION - See Attached

ACTIVITIES - See Assignments Attached

RESOURCES

Periodical: Energy Horizons, 1999 Shepard Road, St. Paul, Minnesota 55116.

Pamphlets: "Andersen Energy Facts," (free), Andersen Corp., Box 12, Bayport, Minnesota 55003.

"The Fuel Savers: A Kit of Solar Ideas," Scully, Prowler and Anderson, (1978) $3.75 includes handling. Total Environmental Action, Inc., Church Hill, Harrisville, New Hampshire 03540.

"Electricity: Use It For All It's Worth," 35¢, Colorado Power Council, 1275 South Eaton Court, Denver, Colorado 80226.

Books & Films: See Housing and Home Furnishings Resources

BACKGROUND INFORMATION

I. Structural Qualities of Windows - a home loses about 30% of its heat through windows. Windows have a very low R-Factor but there are some structural features on a window that will reduce heat loss. It is difficult to eliminate windows completely because of their positive functions of letting in natural light, allowing ventilation and opening the home to exterior views.

Glass by itself offers almost no resistance to the passage of heat. It is the air films on both sides of the glass, or between the panes of double glazing that provide insulation. A sirgle glazing has a total resistance to heat transmittance of only R 0.89. Double glazing, only R 1.8. A resistance of R 18 is common for an insulated wall. In other words, ten or twenty times more heat escapes through each square foot of window than through a wall.

II. Types of Windows

A. Single glazed - one pane of glass between inside and outside of home.

B. Double glazed - two panes of glass with dead air space between.

C. Triple glazed - three panes of window glass. Creating two airspaces between the panes.

D. Aluminum framed - glass held in place by aluminum framing which is a great conductor of heat and cold.

E. All wood framed - glass held in place by frames of wood which allows less conductivity.

F. Vinyl - clad wood framed - a frame of wood holds the glass. On the exterior the wood is covered with a vinyl covering in order to eliminate painting the exterior of the window frame.

G. Storm windows - an additional pane of glass added to exterior or interior which allows space between it and original window and reduces air flow in and out.

H. Stationary (or non-operable) - a window that does not open. Usually has a tighter seal than a window that opens, reducing flow of air.

I. Plastic storm window - an inexpensive plastic sheeting to place over your window that reduces air flow. Usually it is attached in late fall and removed in the spring.

J. Tempered glass window - specially made glass that does not shatter when broken, and therefore, is safer. It is required in some building codes where windows are placed close to an exterior door.

K. Thermopane - special glass designed to have a somewhat greater R-value than regular glass.

III. Ways to Increase R-value of Windows

A. Add weatherstripping to all sides of sash.

B. Recaulk edges of glass every few years.

C. Install storm windows.

D. In new construction, add a layer of foam between window frame and wall.

E. Fill all cracks and spaces around window frames with caulking compound.

Activities
(Assignment)

1. Give students unit objectives.

2. Give students background information.

3. Invite an architect or engineer to speak to the class on calculating heat loss of a home (assignment #1). Heat loss of windows should be done at the same time.

4. Invite factory representative from an insulating window company, (example: Pella Windows, Andersen Windowalls, Posie Windows, Karadco Windows) to speak to class about the structure and quality of windows.

5. Help the students investigate the amount of window area in their classroom or home (assignment #2).

6. Divide class into groups and have each group find illustrations or examples of each of the window types listed in the background information.

7. Have students caulk or weatherstrip a window.

8. Design a bulletin board illustrating the structure of various types of windows.

Activities
(Assignment)

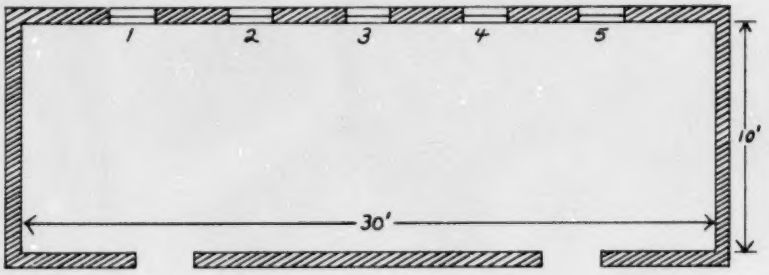
#1
Calculate Heat Loss of a Home

Invite an architect or engineer to help the class to calculate heat loss of a home. Use the information to calculate heat loss in your own home. Report the findings below and figure the amount of BTUs required to keep the home at 68°.

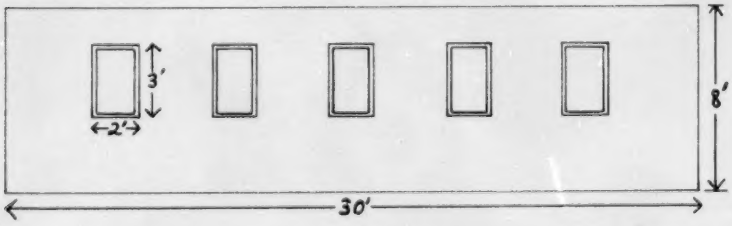
#2
Window Area Investigation

Since glass has much less insulative value than a wall, it is wise to use as little glassed area (windows) as possible to conserve energy for cooling and heating. There are building code restrictions and guidelines for the amount of glassed area: 10 percent of the total square footage of floorspace for the home and less than 20 percent of the total square footage of the exterior wall are generally accepted standards for residences.

It is a simple arithmetic procedure to determine if your home or classroom meets these guidelines. First try the 10-percent-of-the-floor method. In the example below, we see the square footage of the room is 300 square feet.



From the elevation, we see the total glassed area is 30 square feet.



To determine the percentage of glassed area you simply divide:

$$\frac{30}{300} \quad \text{glassed area} = .10 \text{ or } 10\%$$
$$\text{floor area}$$

Activities
(Assignment)

Continued

Now try the 20-percent-of-total-wall-area method. In the example, the total wall area is 240 sq. ft. since 8' x 30' = 240 sq. ft. The glassed area is 30 sq. ft. Therefore, the percentage of glassed area is:

$$\frac{30}{240} = .125 \text{ or } 12.5\%$$

Using either method, the glassed area is within the guidelines.

Now determine if your classroom or home meets the guidelines.

Method I: 10% of floor area

Total Floor Area _____ sq. ft.
Total Glassed Area _____ sq. ft.

$$\frac{\text{glassed area}}{\text{floor area}} = ____ = ____\%$$

Method II: 20% of wall area

Total Wall Area _____ sq. ft.
Total Glassed Area _____ sq. ft.

$$\frac{\text{glassed area}}{\text{wall area}} = ____ = ____\%$$

Suggestions:

1. Try both methods in the classroom before trying to tackle your home.
2. This makes a good group activity.
3. This activity may be used in conjunction with reading floor-plans and measuring interior spaces.
4. Remember to measure only the glassed area of windows - not the frames, too.
5. Note that weather changes will also affect heating and cooling energy uses.

Activities
(Assignment)

What Is It? How Does It Save Energy?

Time: 50 minutes

Students should rotate around the room to approximately 15 different stations. At each station, after viewing a numbered device, they are to fill in their chart (see attached sheet) with what it is and how it saves energy. (A way to introduce energy conservation in the home.)

Suggestions for stations:

dimmer switch

caulking gun

water restrictor for shower head

furnace filter

small piece of mylar

plastic bottle with cap for toilet

several different types of weatherstripping

glass fireplace doors

sponge or foam insert for electrical outlet

piece of insulation

small piece of plastic for window

WHAT IS IT?	HOW CAN IT SAVE ENERGY?

Unit I Resources

Periodical:

Energy Horizons, 1999 Shepard Road, St. Paul, Minnesota 55116.

Pamphlets:

"Sixty Five Ways to Save Natural Gas," U.S. Department of Energy.

"Energy Savings through Automatic Thermostat Controls," U.S. Department of Energy.

"Put the Sun To Work Today," U.S. Department of Energy.

"44 Ways to Build Energy Conservation Into Your Homes," B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"The Arkansas Store," B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"Making the Most Of Your Energy Dollars In Home Heating and Cooling"; the government sends this 16 page booklet to consumers. B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"In the Bank or Up the Chimney," (1976); Chilton Publications, U.S. Department of Housing and Urban Renewal.

"Electricity: Use It For All It's Worth," (35¢) Colorado Power Council, 1275 South Eaton Court, Denver, Colorado 80226.

"How to Save Money by Insulating Your Home," Federal Energy Administration, Office of Energy Conservation.

"Insulations for Thermal and Sound Control," B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

From Public Service Company of Colorado, 550 15th Street, Denver, Colorado 80202 - "Your Energy Budget Manager," and "Feather Your Nest - Use Energy Wisely," "Home Energy Audit Kit."

"How To Insulate Homes for Electric Heating and Air Conditioning," National Mineral Wood Insulation Association, Inc., 382 Springfield Avenue, Summit, New Jersey 07901.

Meyers, Donald, "How To Insulate Your Home and Save Fuel," (1977), $2.00, U.S. Department of Housing and Urban Renewal.

"The Fuel Savers: A Kit of Solar Ideas," Scully, Prowler and Anderson, (1978), $3.75, includes handling. Total Environmental Action, Inc., Church Hill, Harrisville, New Hampshire 03450.

"Andersen Energy Facts," (free) Andersen Corp., Box 12, Bayport, Minnesota 55003.

Reference Books:

Jones, Raymond, Insulation Heat: Framing, Sheathing and Insulation, (1973) VanNostrand Publications.

Anderson, Bruch with Michael Riardan, The Solar Home Book: Heating, Cooling and Designing with the Sun, Harrisville, New Hampshire; Cheshire Books, 1976, 304 pp. (complete, up-to-date, amply illustrated, treats the entire subject well).

Clegg, Peter, New Low-Cost, Energy Efficient Shelter for the Owner and Builder, Emmaus, Pennsylvania, Rodale Press, Inc., 1976, 408 pp. (excellent treatment of a broad range of energy conserving ideas for the home).

Roberts, Rex, Your Engineered House, New York, M. Evans & Co., 1964, 237 pp. $8.95 from J.P. Lippincott Co., E. Washington, Philadelphia, Pennsylvania 19105. (Written in clear non-technical language. Common sense approach to house design.)

The Solar Home Book, Bruce Anderson and Michael Riardan (Cheshire Books), 1977. The fundamentals, history and technology of the solar home in non-technical language. Over 160 illustrations. Includes climatic and design data plus sources for information and supplies. ("Best book yet on solar" - New York Times). 304 pages, soft cover $8.50.

Films, Slides and Filmstrips:

Slides: "Our Energy Problems," H6349R-6, $19.00 per set.

"Alternate Energy Sources," H6362-6, $19.00 per set.

J. Weston Walch
Portland, Maine 04104

Film: "Energy -- New Sources," Churchbill, 1973, 20 minutes color.

Filmstrips: "Energy - Use It Wisely Around the Home," #199, 69-frames and cassettes, Photo Lab, Inc., 3825 Georgia Avenue, Washington, D.C. 20011, $30.00

"Energy For Man," National Geographic Society, 17th and M Street, N.W., Washington, D.C. 20036

"Energy for the Future," National Geographic Society, 17th and M Street, N.W., Washington, D.C. 20036

"Energy For Man," 4 filmstrips and cassettes, BFA Educational Media, 2211 Michigan Avenue, P.O. Box 1795, Santa Monica, California 90496.

Books:

Energy Activities for the Classroom, ERIC Center for Science, Mathematics and Environmental Education, College of Education, Ohio State University, 1976. pp. 23-24.

Energy Conservation in the Home, an Energy Education. Conservation Curriculum Guide for Home Economics Teachers, U.S. Department of Energy, prepared by the University of Tennessee Environment Center and College of Home Economics, Knoxville, Tennessee, October, 1977.

Note: Teacher should collect current articles from periodicals and magazines that give information on ways to conserve energy.

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Coal Minicourse, National Science Foundation, Pre-college Teacher Development in Science Program the Geosciences Today, Purdue University, Department of Geosciences, West Lafayette, Indiana 46907. Dr. Gerald H. Krockover, program director.

How a Bill Becomes a Law to Conserve Energy, developed by National Science Teachers Association under DOE contract #EX-76-C-10-3841. They are available from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

The Minnesota Trial Test Materials, Minnesota Department of Education, 625 Capital Square Building, St. Paul, Minnesota 55101. Tom Ryerson, program director.

Energy Management Strategies for Colorado Home Economics Teachers, developed by the Colorado State Board of Community Colleges and Occupational Education, by the Public Service Company of Colorado and by Energy and Man's Environment of Portland, Oregon (see logos on following page).

Energy Conservation: In the Home and On the Farm, developed by Pennsylvania State University, College of Agriculture, Department of Agriculture Education, University Park, Pennsylvania, in cooperation with Agricultural Education Section, Bureau of Vocational Education, Department of Education, Harrisburg, Pennsylvania and the Pennsylvania Farm Electrification Council, 1980.

Energy - Environmental, Mini-Unit Guide, a product of the NSTA (National Science Teachers Association) Materials Project, John M. Fowler, director. This material is available from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

Here Is Your Indiana Government, 18th Edition, August 1977. Published by: Indiana State Chamber of Commerce, One N. Capitol, Indianapolis, Indiana 46204.

PLEASE TELL US WHAT YOU THINK ABOUT THE SENIOR HIGH SCHOOL ENERGY MATERIALS

Your position: (check)
_____teacher
_____dept. head
_____administrator
_____other

Your grade level: _____

Subject(s) taught: _____

If possible, please answer these questions after you have taught unit lesson(s) in your class and examined teacher's guide. If this is not possible, please answer based on your personal inspection of the unit materials.

1. What project materials are you evaluating? (Check all that apply)
   _____Unit I
   _____Unit II
   _____Unit III
   _____Unit IV
   _____Unit V
   _____Unit VI
   _____Unit VII
   _____Unit VIII
   _____Unit IX
   _____Teacher's Guide
2. What is the basis for this evaluation? (Check all that apply)
   _____(1) teaching 4 or more lessons
   _____(2) teaching 1 to 3 lessons
   _____(3) personal inspection
   _____(4) discussion with others who know materials
3. Have you shared these units with other educators? (Check one)
   _____(1) No
   _____(2) Yes, with 1-4 others
   _____(3) Yes, with 5-10 others
   _____(4) Yes, with more than 10

Circle the number from 1 (Definitely No) to 7 (Definitely Yes) which best reflects your answer.

		DEFINITELY NO			NEUTRAL			DEFINITELY YES
4.	Are these materials easy to understand and use?	1	2	3	4	5	6	7
5.	Do these materials fit with the curriculum of your district?	1	2	3	4	5	6	7
6.	Are you likely to make use of these materials in the future?	1	2	3	4	5	6	7
7.	Are these materials appropriate for the level of your students?	1	2	3	4	5	6	7
8.	Are these materials interesting to your students?	1	2	3	4	5	6	7
9.	Is the reading level appropriate?	1	2	3	4	5	6	7
10.	Do you think these materials will reduce energy consumption?	1	2	3	4	5	6	7

What did you like best? _____

What did you like least? _____

Suggestions/Comments (Use the back as needed): _____

RETURN TO: Energy Education Curriculum Project, Division of Curriculum, Department of Public Instruction, Room 229, State House, Indianapolis, IN 46204.